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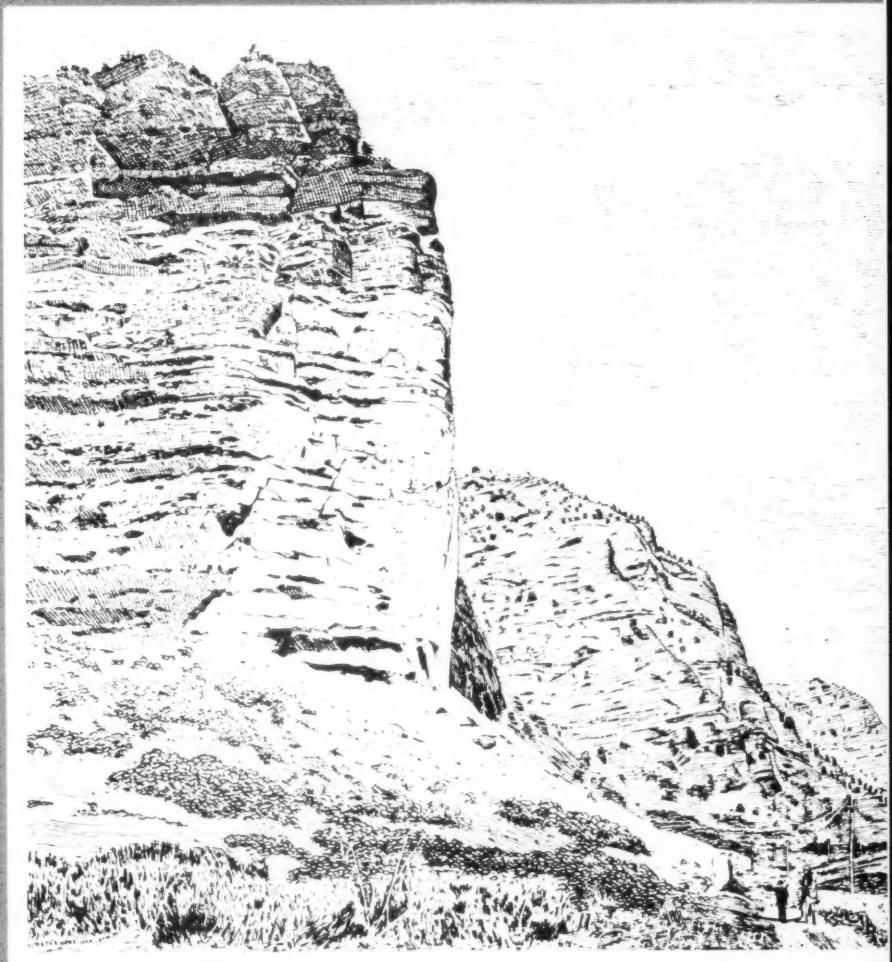

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May 1958

Volume II, No. 11

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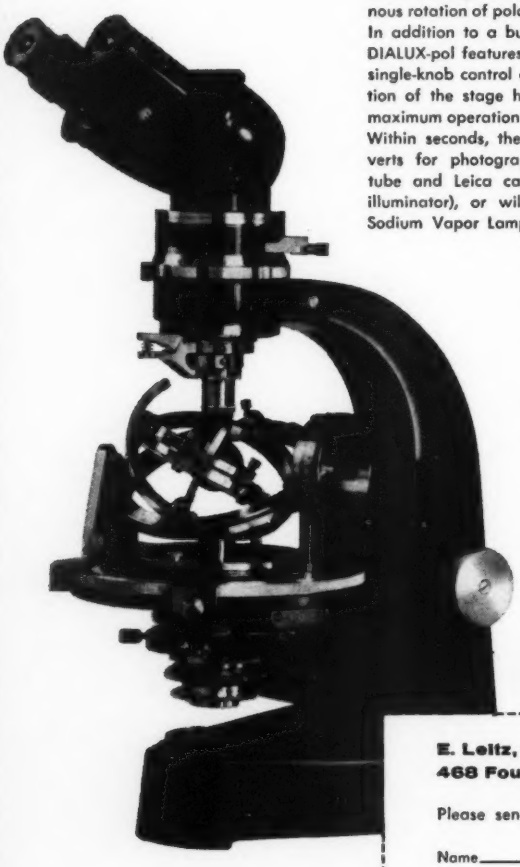

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Calendar

Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calendar is requested.

*May 1-3, 1958—GSA, SOUTHEASTERN SECTION, Co-sponsors are Ala. Geol. Surv. and Dept. of Geol., Univ. of Ala.; Theme: Economic Geology of the Southeastern U. S. in relation to future world events. Hotel Stafford, Tuscaloosa, Ala. Field trips in conj. to Red Mtn., Shelby Co. limestone belt and to mines.

May 5-6, 1958—AIME, SOC. PETROLEUM ENGINEERS, Third Biennial Secondary Recovery Symposium, Wichita Falls, Texas.

May 5-6, 1958—AIME, High Temperature Materials & Their Resources Conf., Ambassador Hotel, Los Angeles, Calif.

May 5-7, 1958—AGU, Thirty-Ninth Ann. Mtg., Nat. Acad. Sci., Washington, D. C.

May 8-10, 1958—GSA ROCKY MOUNTAIN SECTION, annual meeting, Golden, Colo. Front Range trip in conj.

May 9-11, 1958—AIME: URANIUM SECT., 3rd Annual Uranium Symposium, Moab, Utah.

May 17-18, 1958—FRIENDS OF THE PLEISTOCENE; for information write: Wilson M. Laird, Univ. of North Dakota, Grand Forks, N. D.

June 13-14, 1958—AIME: Central Appalachian Sect. spring meeting, Phoenix Hotel, Lexington, Ky. Concurrent separate sessions for fuel & non-fuel interests.

June 19-25, 1958—SCANDINAVIAN-AMERICAN Meteorological Mtg., Write: Mr. Finn Pederson, Secretary, Norwegian Arrangements Comm., Vervarslinga, Bergen, Norway.

*July 4-7, 1958—SWEDISH GEOLOGICAL SURVEY, 100th Jubilee Meetings, Stockholm, Sweden. Excursions before and after meetings.

Aug. 24-30, 1958—INTNTL. CONGRESS OF PREHISTORY & EARLY HISTORY, Hamburg, Germany. For information write: Professor Gerhard Bersu, Frankfurt-am-Main, Palmengartenstrasse 10-12.

Aug. 26-28, 1958—SYMPOSIUM ON PROBLEMS OF THE LAHONTAN BASIN, spons. by Sigma Xi Club of Univ. of Nevada, on campus, Reno, Nevada.

Sept. 2-4, 1958—SVP: Annual Meeting with SSE, University of Michigan, Ann Arbor, Mich.

Sept. 2-5, 1958—NINTH ALASKAN SCIENCE CONF., Univ. of Alaska, College, Alaska

Sept. 17-19, 1958—AIME: SOC. OF MINING ENGRS., Rocky Mountain Mins. Conf., Newhouse Hotel, Salt Lake City.

*Sept. 27-Oct. 5, 1958—GEOLOGICAL SOC. OF VIENNA, 50th anniversary; meetings and field trips. Write: the Society at the Geological Institute, Univ. of Vienna.

Oct. 5-8, 1958—AIME: SOC. PETR. ENG., Ann. Fall Mtg., City Coliseum—Rice Hotel, Houston, Texas.

Oct. 9-11, 1958—OPTICAL SOC. OF AMER., Ann. Mtg., Statler Hotel, Detroit, Michigan.

Oct. 13-16, 1958—SEGp: 28th Ann. Meeting, Gunter Hotel & Municipal Auditorium, San Antonio, Texas.

Oct. 16-17, 1958—AIME: Southern California Petroleum Sect. Fall Meeting, Biltmore Hotel, Los Angeles.

Oct. 22-24, 1958—AAPG, Southwest Regional Meeting, sponsored by SW Fed. of Geol. Socs., City Auditorium, Mineral Wells, Texas.

Oct. 23-25, 1958—AIME: Mid-America Minerals Conference, Chase-Park Plaza Hotels, St. Louis.

Oct. 27-29, 1958—GULF COAST ASSOC. OF GEOLOGICAL SOC'S., Ann. Mtg., Corpus Christi, Texas

Nov. 6-7, 1958—AAPG: PACIFIC SECT. Ann. Mtg., Ambassador Hotel, Los Angeles, Calif.

Nov. 6-8, 1958—GSA: ANNUAL MEETING, St. Louis, Mo. Also SEcG, SVP, PS & AGT.

1958 SCHEDULE OF FIELD TRIPS

For additional field trips held in conjunction with meetings, see those items marked with an asterisk under meeting calendar.

May 9-11, 1958—N.Y. STATE GEOLOGICAL ASSOC., 30th Ann. Field Mtg., Shustin's Locust Manor, Locust Ave., Peekskill, N.Y.

May 10—ILLINOIS Acad. of Science, Urbana, Ill. Pleistocene & Pennsylvanian of Champaign-Urbana.

May 10-11—FIELD CONFERENCE OF PENNSYLVANIA GEOLOGISTS, 23rd ann., Harrisburg, Pa., Hagerstown, Md., north & Blue Ridge area. Guidebook.

May 15-17—CORPUS CHRISTI Geol. Soc., Corpus Christi, Tex. Field trip of Texas coastal area.

May 17—ILLINOIS Geol. Survey, Urbana, Ill. Glacial, Ordovician & Silurian of Kane & Cook Counties.

June 20-22—MICHIGAN BASIN GEOL. SOC., Escanaba, Mich. Field trip in the East Menominee iron range.

July 23-26—WYOMING GEOL. ASSOC., Casper, Wyo. To Powder River Basin. Guidebook.

Aug. 14-16—BILLINGS, MONT., Geol. Soc. 9th Ann. Field Conf., to Bear Tooth Mtns. immediately north of Yellowstone Park. Reservations (until July 15) must include $5.00 room fee. Write: Publicity & Reservation Comm., Box 1982, Billings, Mont.

Aug. 20-23—ALBERTA Soc. of Petr. Geol., Calgary, Alta. Field trip to Front Range Canadian Rockies. Guidebook.

Sept. 5-6—FRIENDS OF THE PLEISTOCENE, Rocky Mtn. Sect., field trip in Jackson Hole area of NW Wyoming. Write: John Montagne, Dept. of Geog. & Geol., Montana State College, Bozeman, Mont.

Sept. 10-12—BILLINGS GEOL. SOC., Billings, Mont. Montana Stratigraphy of Williston Basin.

Sept. 17-20—KANSAS Geol. Soc., Wichita, Kansas. To south central Colorado. Write: 508 East Murdock, Wichita, Kansas.

Sept. 18-20, 1958—ROCKY MT. ASSOC. OF GEOLOGISTS Field Trip, Maroon Basin of N.W. Colo., to be held in conjunction with Colo. Pennsylvanian Symposium guidebook presentation. Date is tentative.

Oct. 4, 1958—UTAH GEOLOGICAL SOC., Ann. Field Trip to Stansbury Range. Write: 200 Mines Bldg., Uni. Utah, Salt Lake City, Utah.

Oct. 16-18—NEW MEXICO Geol. Soc., Roswell, N. M. To Black Mesa Basin.

Oct. 27-29—GULF COAST ASSOC. of Geol. Soc's., Corpus Christi, Tex. Trip as conducted by Corpus Christi May 15-17.

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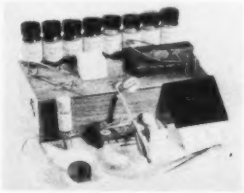

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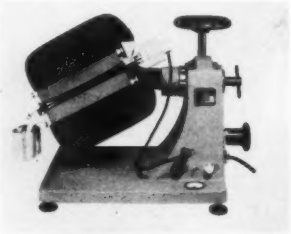

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This Month in GeoTimes

Professional News Magazine

Published by THE AMERICAN GEOLOGICAL INSTITUTE

Robert C. Stephenson, EDITOR

Kathryn Lohman CIRCULATION MANAGER

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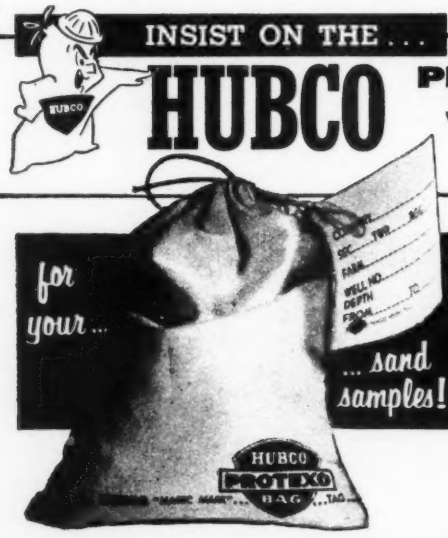

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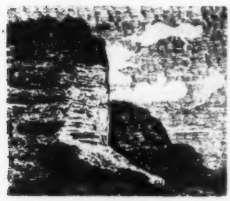
Research Institutes

Many geologists and geophysicists feel that there is insufficient basic research being conducted in the earth sciences. Furthermore, there is concern over the lack of research workers to fully capitalize on the wealth of geophysical data being collected during the International Geophysical Year. There is a recognized need for research into the origin and accumulation of petroleum and on the methods of finding petroleum. Research also is much needed on the geology and geochemistry of ore deposition. Significant gaps in areas of geologic knowledge can be found on almost every front.

In May 1956, the Advisory Committee on Minerals Research, an outstanding group of scientists headed by Dr. James Boyd, reported to the National Science Advisory Board that a well founded program of research into the distribution and occurrence of mineral deposits is needed if our nation is to maintain mineral adequacy necessary to industrial supremacy. The Committee felt that the mining industry should support a Mineral Research Institute to foster research in these areas. Industry received the report and recommendations of the Advisory Committee with interest but could develop no enthusiasm for support of such an Institute. As a result the idea lies dormant and mineral research is still not getting done.

In February 1956 leaders from the field of geophysics met under auspices of the NSF to discuss the status of theoretical geophysics. It was pointed out then—before the start of IGY—that geophysical data were accumulating far faster than available research geophysicists could study and analyze them. It was generally agreed that a number of institutes of theoretical geophysics should be established to aid in advancing the theoretical science. Although a number of schools have indicated interest in such institutes, none have been formed in the two years since the recommendations were made.

The needs for geophysical institutes and for a mineral research institute are certainly no less acute today than in 1956. Why then, now when the climate is favorable for expanding scientific research, are such institutes not being established? If industry cannot assume the lead in mineral research, then why shouldn't schools seek to establish mineral research institutes? If the formation of an institute of geophysics or mineral research is too big for one school, then perhaps they should band together. The needs will not be filled without action and the action must come from within the profession.



OUR COVER

A pen and pencil sketch of Echo Canyon, Utah, 1877, from the reports of the U. S. Geological Exploration of the Fortieth Parallel. *Courtesy of U. S. Geological Survey*

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.

Better Geologists for Industry?

By JOHN C. MAXWELL[1]

How is the stature of a science measured? This is a difficult question to answer, but we can probably agree it is a function of the stature of individuals within the science. How then is the stature of individual scientists measured? Various criteria come to mind—general intelligence, breadth and depth of knowledge, and above all creativity, the ability to make the leap to new and daring concepts from a springboard of facts which are common knowledge to his fellow scientists. What is the educational background of the able scientist? Generalities are dangerous here, but again I think we can agree that he must have available the backlog of knowledge which will enable him to perceive the uncommon answer in a maze of common experience. Two factors are involved primarily—*knowledge* and *judgment*. It is a common experience in science that great discoveries are made almost simultaneously by two or more scientists working independently. Their discoveries are based on accumulated knowledge, and most radical advances could not have been made until knowledge had evolved to that particular level. Nevertheless the advances are usually made by scientists with an exceptionally broad grasp of their own and of related fields, able to comprehend significant data which would be unknown to, or ignored by their less well prepared colleagues. Judgment—a combination of intelligence and experience—controls the ingestion and digestion of data and recognizes combinations and permutations that are apt to be significant. Without the ability to select pertinent data, an educated man would be merely a museum of embalmed facts and theories.

After this flight of educational fancy let us return to solid earth. Anyone who has read this far might even be wondering what all the noise is about. Precisely it is about some figures published in past numbers of GeoTimes. On page 10 of the January 1957 number we are informed that results of the 1954-55 questionnaire issued by the National Register of Scientific and Technical Personnel show that of all scientists who replied, a total of 85,986, 41.3% possessed Ph.D. degrees, while the percentage of geoscientists with the Doctor's degree was 16.6%. In the same survey[2] 51.1% of the registered physicists and 47.8% of the chemists held the Ph.D. degree. Partial results of the 1956 survey, quoted on page 15 of the May 1957 issue of GeoTimes show the following results in percent of Bachelors' degrees awarded in each science for the year 1956:

	Total Number			Pct. of Bachelors' Degrees		
	BS	MS	PhD	MS	PhD	T
CHEMISTRY	6178	1159	976	19	16	35
PHYSICS	2335	739	457	32	20	52
EARTH SCIENCES	2201	524	145	24	7	31

The percentage of advanced degrees in relation to Bachelors' degrees is significantly higher in chemistry and physics than in the earth sciences, and would be greater yet in chemistry if allowance were made for the large number of Bachelors' degrees in that science awarded to pre-medical students (over 50% of chemistry majors at Princeton are pre-medical students). The discrepancy is not great enough, however, to explain why the percentage of Ph.D.'s in chemistry so far outnumbers the percentage of Ph.D.'s in geology as listed in the 1954-55 Register. The answer seems to be that in industry the man with only the Bachelor's degrees does not long survive as a chemist or physicist and for the most part is employed in a non-scientific capacity.

In geology, on the other hand, a large

[1]John C. Maxwell is Professor of Geology at Princeton University. He has done research work in the field of geology and geophysics. In the past he has worked for several major oil companies.

[2]Scientific Manpower Bulletin, No. 7, National Science Foundation, November 1956.

majority of professional men have received only the bachelor's degree. A number of companies have recently changed their recruiting policy to favor men who have completed work to the Master's level, but only two or three actually prefer Ph.D.'s for their exploration and production staffs. Many able men, finding it possible to obtain professional employment at a low educational level, are not willing to make the effort to continue their education. In view of the high standards demanded of other scientists it is worthwhile to consider whether geologists should be an exception.

Limitations of Low Educational Level

Few professors today would consider a man with the Bachelor's degree to be prepared to go to work as a practicing geologist. At the end of his undergraduate career the student has, at best, an introduction to several branches of geology. His education must of necessity reflect the theories and prejudices of his elementary textbooks and of a very few professors. Furthermore, only the exceptional man will realize that he has been given but a small sampling of the science and that much of what he learned as "fact" is in reality merely currently accepted theory. In other words, he has neither the broad foundation of knowledge nor the bases for judgment necessary for a scientific career. Does an advanced degree provide the requisite broad knowledge and experience? In all honesty he would have to say, not necessarily. However the candidate for a higher degree is required to extend his education in both breadth and depth and, what is most important, to gather a knowledge of fields which appear at the moment to be not directly pertinent to his planned future career. It is such apparently marginal information that often provides the impetus for great advances.

Why then has industry preferred men with the Bachelor's or at most Master's degree? The reasons given are quite consistent. They are that the company geological organization can absorb only a certain number of Ph.D.'s; that they create problems in pay scales; that they are satisfied only with "research" positions. Occasionally we are told quite frankly that putting Ph.D.'s in the organization would create problems for older supervisory personnel. Unquestionably there are difficulties. Is it, then, worth the effort to attempt to use Ph.D.'s in a company organization? Most of us in the academic world who have had some experience in industry feel the answer is a resounding "yes!"

(Continued on page 18)

GEOTIMES goes to 8 issues

GeoTimes will complete its second year with the June 1958 issue. Its circulation has increased in that span of time from 16,000 in July 1956 to more than 30,000 essentially all of the members of AGI's 14 Member Societies.

Beginning with the July issue, GeoTimes will be published eight times per year instead of monthly. The reduction in the number of issues, voted by the Board of Directors of the American Geological Institute at its April meeting in Los Angeles, is being adopted as an economy move.

The great increase in circulation of GeoTimes and the pinch of inflationary cost increases has posed a serious threat to GeoTimes. It was recognized that Member Societies could not be expected to increase their level of support of the Institute to provide adequately for both GeoTimes and the basic existence of the AGI office. After considerable deliberation it was decided that the reduction of the number of issues of GeoTimes from 12 to 8 per year afforded the most significant cost-saving action which could be taken, with annual savings of over $10,000 resulting from this and other GeoTimes economy measures.

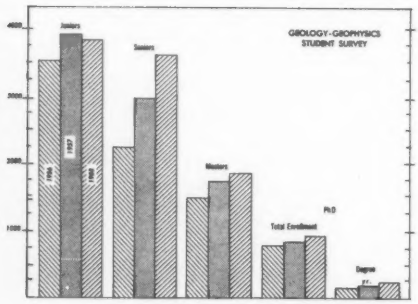
Historically, it is interesting to compare the Board's action with that of the AGI Board in April 1955 when it voted unanimously to increase the *Geological Newsletter* (predecessor to GeoTimes) from 9 to 12 issues. At that time the *Geological Newsletter*, which had been undertaken on an expanded scale in September 1954, was hailed by the Directors as a big success and they proclaimed that is should go monthly to all members of the profession.

The move to reduce the number of issues of GeoTimes is not as much of a curtailment as might appear, for the size of the average issue will be increased from 24 to 32 pages, including cover. Although there will be a 33 per cent reduction in issues it is anticipated that the reduction in total news and editorial space will be less than 10 per cent per year. The greater number of pages per issue will afford greater flexibility in magazine organization; this should make for a better magazine.

The reduction in issues of GeoTimes will not result in curtailment of staff. *GeoTimes has no staff.* The relationship of GeoTimes to the AGI staff may be illustrated by a snake which has just feasted on a rabbit. In this instance the AGI staff is the snake and GeoTimes is the bulge made by the rabbit. The staff extends itself to accommodate the bulge of GeoTimes but, unlike the snake, we don't get to sleep it off!

GEOLOGY-GEOPHYSICS STUDENTS IN UNITED STATES AND CANADA IN 1958

Preliminary report shows student population is still on rise



Graphic comparison of 1958 student enrollment in geology and geophysics in the United States with enrollments reported in 1956 and 1957.

	GEOLOGY				GEOPHYSICS			
	1958	% Change in 1958	1957	1956	1958	% Change in 1958	1957	1956
				UNITED STATES				
Undergraduate								
Seniors	3511	19.9	2928	2359	92	70.4	54	58
Juniors	3722	-2.5	3819	3421	103	19.8	86	84
MA								
Candidates	1760	7.1	1644	1391	94	23.7	76	87
PhD Program								
Degree Year	198	18.6	167	150	23	-	23	20
Int'med. Year	379	1.3	374	305	42	-14.3	49	52
First Year	247	16.0	213	229	26	300.3	6	27
Total Enrollment	824	9.3	754	684	91	16.7	78	99
				CANADA (1)				
Undergraduate								
Seniors	231	26.9	182		10	100.0	5	
Juniors	291	25.4	232		28	100.0	14	
MA								
Candidates	95	4.4	91		8	-11.1	9	
PhD Program								
Degree Year	30	76.5	17		-	-	2	
Int'med. Year	21	5.0	20		2	-33.3	3	
First Year	24	33.3	18		2	100.0	1	
Total Enrollment	75	36.4	55		4	-33.3	6	

(1) Not surveyed in 1956

Table comparing 1958 geology-geophysics student enrollments at various academic levels in colleges and universities of Canada and the United States with those of two previous years.

The American Geological Institute recently completed the 1958 survey of students majoring in geology and geophysics in the colleges and universities of the United States and Canada.

This year the survey was conducted in January and February instead of April in order that the data collected could be used both for the Levorsen survey and the AGI survey. Dr. A. I. Levorsen for a number of years has surveyed the student population of a selected group of 75 schools. His data are published annually in the AAPG Bulletin. Dr. Levorsen's report on these 75 schools for 1958 will appear in an early issue of the Bulletin.

The Canadian departments of geology and geophysics were surveyed for the first time in 1957 and all deuartments queried responded. In 1958 all 16 schools responded promptly so that no follow-ups were needed (the batting average in the U.S. was not that good). Canadian schools showed a 25 per cent increase in geology-geophysics majors in 1958 over the previous year. Enrollment was up at all acadenic levels for geology students, but the enrollment for graduates working toward the PhD in geophysics was down rather sharply. Since the numbers involved are small, however, relatively minor changes make for substantial percentage differences.

In the United States several significant changes were noted in the student population as compared to 1957. In 1957 depart-

	Colleges Queried	Colleges Responding	Total Geology-Geophysics Students	No. in Geology	No. in Geophysics	Per Cent Undergrad.	Per Cent in MA Program	Per Cent in PhD Program
				UNITED STATES				
1958	210	207	10,197	9,817	380	72.84	18.19	8.97
Change in 1958	1.4%	1.5%	8.0%	7.3%	29.3%			
1957	207	204	9,439	9,145	294	72.96	18.23	8.81
1956	205	194	8,093	7,765	328	72.06	18.26	9.68
				CANADA (1)				
1958	16	16	742	692	50	75.47	13.88	10.65
Change in 1958	-	-	24.9%	23.6%	47.1%			
1957	16	16	594	560	34	72.90	16.83	10.27

(1) Not surveyed in 1956

Table summarizing the 1598 student population in geology and geophysics in colleges and universities of Canada and the United States with those of the two previous years.

ments of geophysics reported shrinking enrollments over 1956, whereas in 1958 the total population of geophysics students was up sharply to 29.1 per cent higher than in 1957. The most significant figure was the much larger number of new graduate students entering training toward a doctorate.

Statistics on the student population in geophysics are not particularly meaningful, however, for a large proportion of geophysicists enter the field after training in physics or geology. Furthermore, the term geophysicist means many things to many people. By weight of numbers, the largest segment of geophysicists is engaged in mineral exploration and is geologically oriented. The much-publicized IGY program involves a minority of the total professional geophysicists, and much of the program is non-geologic.

In geology the number of students in U.S. departments appears to be levelling off. The percentage increase of all students in 1958 over the previous year was 7.3 per cent, whereas in 1957 it was 17.77 per cent over 1956.

All indications are that there will be a significant upswing in graduate enrollment next Fall. Jobs are not abundant this Spring for the college graduate with no graduate training. Furthermore, there is a noticeable trend on the part of industry toward more recruiting effort at the Masters and PhD levels. Certainly in the future jobs opportunities will be more abundant, starting pay will be better, and advancement possibilities more promising for those with graduate school training.

EMPLOYMENT OUTLOOK

June graduates in geology and geophysics in the U.S. and Canada are finding the employment outlook less favorable than it has been in recent years, according to Department Heads who were queried recently by AGI. Generally speaking, the services of graduates at the Masters and PhD level are still in good demand, although job candidates are having fewer offers to choose from and employers are being more selective. Graduating seniors, with only the bachelors degree, are finding jobs scarce. The curtailment of exploration for petroleum and minerals in both the U.S. and Canada is responsible for the decline in employment opportunities, for there are actually more jobs available in some fields, such as engineering and groundwater geology. Many companies are raising their recruiting sights and are now concentrating primarily on men with graduate degrees. As a consequence it appears certain that graduate school enrollments will increase in 1958-59. This trend should be beneficial in the long run. Department Heads responding to the student survey were also asked to give starting salaries at which students were being employed. The average starting salary of graduating seniors is estimated to be $440 per month for employment in North America, for men with the Master's degree $507 (up from $483 in 1957) and for PhD's $641 (compared to $612 in 1957). Salaries for overseas employment are 15-25 per cent higher than those prevailing in North America.

Reginald Daly 1871-1957

Tribute to a stimulating and truly great geologist

By Marland P. Billings

Reginald Aldworth Daly, Sturgis Hooper Professor of Geology, Emeritus, of Harvard University died in his 87th year at his home in Cambridge, Massachusetts, on September 19, 1957 after a long illness. He was generally acknowledged to be one of the most stimulating and, at times, controversial geologists in America. He was well known through the world and was an honorary member of many foreign and scientific societies.

Because of his early field work he speculated a great deal about the origin of igneous rocks. The hypothesis of magmatic stoping resulted from his field observations at Mt. Ascutney, Vermont. Moreover, the variety and sequence of igneous rocks at this locality led him to develop the theory of a liquid basaltic substratum beneath the crust. He prepared his well-known tables in order to have proper quantitative chemical data on the great diversity of igneous rocks and their relative amounts in the crust. To explain this diversity he developed what he called an eclectic theory. For each magmatic cycle he envisioned the basaltic magma as invading the crust along abyssal fissures. As a result of stoping, great blocks sank into the basalt and were there assimilated. Then this syntectic magma differentiated into a great variety of igneous rocks. Assimilation of limestone produced alkalic rocks. In his later years he recognized that granitic rocks might also arise from "pure melting" of sialic blocks depressed into the sub-stratum. He prepared a systematic classification of igneous rock bodies. As a result of his observations in Hawaii, he developed his two-phase convection theory to explain the rise of magma in volcanic vents. A field study of carbonatite dikes in South Africa convinced Daly that they were of magmatic origin.

Although much of Daly's earlier work was concerned with igneous rocks, he soon became interested in the origin of coral reefs and developed his glacial-control theory. Many years later he invoked this same theory to explain submarine canyons. His field work in the North American Cordillera of Alberta and British Columbia from 1901 to 1915 opened up numerous other problems for him. The absence of Precambrian fossils led to the hypothesis of a limeless ocean. The nearly horizontal schistosity in the Shuswap terrace caused him to adopt the idea of load metamorphism and to write a paper on metamorphism and its phases.

Because of a trip to Labrador early in his career, Daly became interested in the post-glacial uplift that resulted from the melting of Ice Caps. This subject intrigued him throughout his life and he became greatly interested in the problem of isostatic adjustment.

It was inevitable that Daly's interest in igneous rocks and isostasy should lead him into the depths of the earth. Consequently he became more and more interested in geophysics. In his later years he wrote papers on such subjects as the elasticity of the outer shells of the earth, discontinuities within the earth, strength of the earth's outer shells, meteorites and an earth model, and the nature of the asthenosphere.

Daly's geological work may be summarized by saying that keen field observations coupled with a fertile imagination led to many new theories.

Vienna Geologists Celebrate

The Geological Society of Vienna is celebrating its 50th Anniversary Sept. 27-Oct. 5, 1958. Scientific sessions will be held in Vienna Sept. 29-Oct. 1 and eleven field excursions in Austria are planned in conjunction with the scientific program.

Details on the meeting may be obtained by writing the *Geological Society of Vienna, Geological Institute, University of Vienna.*

Report On Immigrant Scientists

A recent publication of the National Science Foundation, NSF-58-4, No. 8, Feb. 1958, *"Immigration of Professional Workers to the United States—1953-56"* indicates that in the period 1953-56 3,231 natural scientists were admitted to the U. S. as immigrants. Of this group 166 were geologists and geophysicists. During this same period there were 1,520 chemists and 323 physicists admitted to the United States. Professional, technical and kindred workers accounted for 64% of all immigrants in 1953-56 period.

LEFT. *Judson Mead demonstrates geophysical equipment on Indiana U. telecast entitled "Exploring with Geophysics." No. 1 camera used for speaker shots; No. 2 camera used for close-ups of equipment.*

RIGHT. *D. J. McGregor prepares for the opening on the telecast "Non-metallic Resources." Specimens are handled separately by an assistant.*

Our Geologic Heritage

Indiana stages TV series

By DONALD E. HATTIN[1]

Members of the geology faculty at Indiana University, with cooperation from members of the Indiana Geological Survey, have completed recently a fifteen-week television series entitled *Our Geologic Heritage*. Initially, this popularized series was presented on the local channel, WTTV, but is currently being viewed over the entire state. Kinescope films of *Our Geologic Heritage* are being circulated to eleven stations in the Indiana University Radio and Television State TV Network; the programs will continue until late August and will ultimately have appeared at several different times of day and on different days of the week during this period. According to recent surveys, the average local audience for Indiana University productions is about 15,000; the actual network audience will probably number over 200,000 persons. The advantages of kinescoping and of statewide coverage for the series need hardly be stressed here.

Our Geologic Heritage includes six shows concerned with fundamental principles of geology that are followed by eight programs on economic aspects of the science. The final telecast is a summation of the entire series with especial reference to Indiana. Presentation is at the high school level of scientific thinking because a primary objective is stimulation of geological interest in the prospective college student.

A variety of standard television and classroom techniques were employed in production of *Our Geologic Heritage*. Rear-screen slide projection, superimposition of technical words, and ample use of blackboards, specimens, charts, graphs, geophysical equipment, cartoon drawings, and a film are examples of the many illustrative devices utilized by participants in the series.

Some helpful ideas are made to our readers who are potential television performers. The Indiana University group discovered that the displaying of specimens is more artfully accomplished by an assistant who manipulates the desired object before a separate camera and whose hands only are seen. Such procedure eliminates possible annoying delay that attends focusing of an on-stage camera when the speaker attempts to handle the specimens. Our TV producer favored the "gimmick"-type opening wherein the viewer's attention is immediately gained and held by use of some eye-catching object or scene. On the show concerning non-metallic resources, for example, the audience sees first a hamburger upon which salt is being shaken. A program on interpretation of earth history begins with the performer holding a mastodon humerus before the lens. The telecast on geophysics commences with comparison of surficial irregularities on a basketball with those on the earth's surface. Such openings are easily effected, and very desirable. Most members of the "Geologic Heritage" team believe that the one-man science show is less stimulating to audience and participant than the program in which questions are directed at the main performer by a second individual. The changes of scene afforded by the presence of two persons, and the value of dialogue as contrasted to monologue, make a rather strong case for the latter type of show.

It is hoped that this brief account of our experience will be of same assistance to those engaging in future geology telecasts. The full potential of television is not yet realized by many professed educators, but to sneer at this great engineering achievement is to join the ranks of millions who laughed at the steamboat and automobile. Television can effect public awareness of geology faster and perhaps more effectively than any other popular medium. We should avail ourselves of every opportunity to use this means of mass communications for the aggrandizement of the earth sciences.

[1]Dr. Hattin is a member of the geology staff at Indiana University, Bloomington, Ind.

The Educational Extension Program of the Illinois Geological Survey

By GEORGE M. WILSON[1]

Twenty-nine years ago the Illinois State Geological Survey, confronted by the problem of finding ways to bring geological information to the interested layman, established its Educational Extension section and put it to work acquainting the people of Illinois with the ground under their feet.

Attacking the problem from numerous angles, the Educational Extension office, under its first directors, Don L. Carroll and Gilbert Raasch, and since 1954 under the direction of George M. Wilson, has built up a series of services furnishing geologic information to a diverse audience.

Outstanding among the Educational Extension services are the highly popular Earth Science Field Trips, six of which are conducted each year. Dividing the state into six sections, Educational Extension allots one trip to each section annually, the location within each area being changed every year. Three trips are held in the autumn and three in the spring.

The trips are announced well in advance to schools, clubs, and former participants, and newspaper publicity invites anyone interested to attend. At the outset of each trip, everyone is given a printed itinerary of the tour which notes the geological features along the way. Detailed maps of the route are furnished to the drivers of the cars. The caravan makes several stops at spots of particular geologic interest and there staff members explain the phenomena, answer questions, and aid those interested in collecting rocks or fossils.

The field trips have attracted an increasing number of participants each year from both Illinois and bordering states, a crowd of over 300 being not unusual. There is a brisk demand for back issues of the itineraries from teachers and other persons interested in conducting their own field trips.

In addition to taking the people to geology, Educational Extension takes geology to the people. Since 1931, they have sent sample sets of typical Illinois rocks and minerals to Illinois schools, scout councils, nature and science clubs, libraries, and other educational organizations requesting them.

The demand for the specimen sets has increased every year and in 1957 more than 1500 sets were assembled and distributed. In order to reach the overwhelming number of new schools in the state, rock sets are now being sent to county superintendents for distribution to their schools.

The rock samples are collected and prepared by staff members and packed in attractive display boxes. An accompanying set of printed cards gives essential information about each rock, mineral, or fossil. To date some 7,000 sets have been distributed. No charge other than the postage fee is made for them. They are sent only to Illinois groups such as mentioned, however, and never to individuals.

Publications, including both maps and booklets, are an important part of Educational Extension work. Several booklets have been written by Survey geologists in simple yet technically correct style for the Educational Series. The latest of these, "A Guide for Beginning Fossil Hunters," by Charles Collinson, has been used widely the past year in elementary and high school science classes and even in college paleontology courses.

A guide to Illinois rocks and minerals, replacing an earlier one that is out of print, is soon to be published, and work has been started on a guide to Illinois industrial minerals. Also projected are elementary guides to the geology of southern, central, and northern Illinois. About 10 other booklets are in the planning stage.

Geologic maps also are distributed by Educational Extension, one of which deals with the industrial mineral resources of Illinois. It shows the location of known mineral deposits and the plants and factories using them. Another is a land form map that shows the principal stream drainage systems and significant topographic forms of the state.

A program to help science teachers procure proper material for teaching earth Extension. Each September it sends to the science has been designed by Educational science teachers or principals of all Illinois schools its field trip calendar and a list of all the services of the Survey and of the Survey publications they might find useful

[1] GEORGE M. WILSON is director of the very effective Educational Extension office of the Illinois Geological Survey. He has been a member of the AGI Public Education Committee for several years.

in their classes. These aids were mailed to 8,000 persons in the fall of 1957.

It is Educational Extension's task, also, to handle the avalanche of rock and mineral specimens the public sends to the Survey for identification. If, after identification is made, chemical analysis of the rock is deemed advisable to determine its economic possibilities, the sender is so informed and a list of reputable laboratories is sent him. Hundreds of letters requesting information on general geologic topics also are referred to the Educational Extension section for answer each year.

Special stories on particular phases of Survey work and Survey services or activities also are prepared by Educational Extension. Recently information was furnished to the State Chamber of Commerce so that it might inform its members of the mineral resources of Illinois and their economic potential. Press releases on current Survey publications and activities, sent to newspapers through the Department of Division Reports in Springfield, also are prepared by Educational Extension to keep the public informed about latest advances in geology.

Exhibits on Illinois geology and Survey contributions to its study are made by the Educational Extension staff and sent to professional meetings such as the International Geological Congress, the Geological Society of America, American Association of Petroleum Geologists, and National Water Well Drillers. Special displays of a less specialized nature also are made for the Illinois State Fair each year.

Educational Extension arranges for clubs and other groups special lectures by Survey staff members on geology, mineral economics, or the Survey program and its relation to the mineral industry and mineral conservation in Illinois. Useful in these lectures is Extension's collection of photographs and colored slides illustrating the mineral wealth of the state and the work of the Survey.

Even the Boy Scout program receives an assist from this energetic office. The 30 Boy Scout Councils of Illinois have been informed by Educational Extension of the materials available to help Scouts acquire the geological merit badge. Topographic maps, rock sets, and other informative material is sent to the councils, at their request, and the material is passed about among the troops for study. All 30 of the councils have responded to this offer.

A study is being made at present by Wilson on the possible use of movies and television programs to reach a wider audience of geology fans.

GEOLOGY in the Public Eye

by Robert L. Bates

The Oklahoma City Geological Society has granted Junior Scientist awards to four outstanding high-school students for 1958. The one girl in the group developed a radio telescope; the three boys' projects were solid fuels for rockets, small mammalian bones, and a loudspeaker with high voltage produced by radio waves. Three of these are obviously right up to date. How'd that young paleontologist get in there?

In February the San Francisco Engineering Council held a career conference for high-school students on engineering and science, and geology was represented by Dr. George Kiersch of the Southern Pacific Railroad. He reports a total attendance of 300, of whom 52 attended the two panel discussions that included geology. Some 22 students requested copies of the AGI career booklet.

Willard Parsons of Wayne State University rises to comment on the discussion of rockhound clubs that recently appeared in this space. Parsons believes these clubs offer an outstanding opportunity for geologists to publicize their profession and recruit new students. He says, "Here is a chance to meet about half a million people who already have some interest in at least one phase of earth science . . . I believe we can have much greater positive results than is possible even with a group like the Boy Scouts." The Wayne department has worked with the Michigan Mineralogical Society for 10 years. Members of the department have given talks, held office, conducted evening courses in geology, and helped on the society's field trips. The relationship works both ways. Several student members have later become geology majors at Wayne; the society has given the department a fine emerald specimen; and one member bequeathed it a valuable mineral collection. Parsons believes other departments might receive similar dividends from close association with mineral societies.

Your correspondent is feeling particularly kindly toward rockhounds. One of these columns was reprinted, with kind remarks, by *The Mineralogist* of Portland, Oregon, in its February-March issue.

If you have a story on Geology in the Public Eye, write: Dr. Bates, Dept. of Geology, Ohio State University, Columbus, Ohio.

AGI MASTER LIST

Reveals new information on profess

INTER-RELATION OF MEMBERSHIPS IN THE MEMBER SOCIETIES OF THE AMERICAN GEOLOGICAL INSTITUTE

	AAPG	AGU	AIME	AASG	AGT	GS	GSA	MSA	PS	SSA	SEcG	SEPM	SEGp	SVP
AAPG		863	1433	32	153	254	2120	131	376	109	207	996	1622	32
AGU	863		423	21	114	426	1070	211	74	375	231	194	793	9
AIME	1433	423		27	63	206	798	179	23	81	409	161	354	8
AASG	32	21	27		9	11	48	8	5	2	23	7	0	1
AGT	153	114	63	9		73	286	65	47	16	35	60	10	9
GS	254	426	206	11	73		618	308	27	55	235	85	62	5
GSA	2120	1070	798	48	286	618		497	400	156	628	596	242	80
MSA	131	211	179	8	65	308	497		16	20	159	75	15	4
PS	376	74	23	5	47	27	400	16		2	13	238	8	58
SSA	109	375	81	2	16	55	156	20	2		33	23	207	1
SEcG	207	231	409	23	35	235	628	159	13	33		37	58	4
SEPM	996	194	161	7	60	85	596	75	238	23	37		71	20
SEGp	1622	793	354	0	10	62	242	15	8	207	58	71		2
SVP	32	9	8	1	9	5	80	4	58	1	4	20	2	

Geologists and geophysicists owe a tremendous vote of thanks to AGI's Kathryn M. Lohman and her assistants, Mrs. Mary Lou Brown and Miss Christine Crittenden, for their monumental work on the recently completed AGI Master List. This list affords the first real insight into the size of the profession and shows the interrelation of memberships held in the 14 Member Societies of the American Geological Institute. For months they have labored long, tedious hours over heterogeneous membership lists collating, checking names and compiling them without duplication into the AGI Master List which now contains over 30,000 names.

The Master List is the mailing list for GeoTimes and on March 1, 1958, when the figures presented here were compiled, GeoTimes was mailed to 32,721. Of these, 29,748 recipients of GeoTimes were members of one or more of the 14 AGI Member Societies. At this time there were also 400 paid subscribers, 1300 students and about 1200 other non-members on the GeoTimes mailing list. These non-members, other than paid subscribers, have been receiving GeoTimes as a result of having returned questionnaires to the Earth Science Register. It is anticipated that all non-members will be dropped within 6 months.

Of the 29,748 members of AGI Member Societies, 21,432 hold memberships in only one of the 14 Member Societies as is shown by the table at the top of page 15. The compilation also shows that 21,070 memberships in the 14 societies are held by 8,316 individuals who belong to more than one AGI Member Society. These individuals hold an average of 2.5 memberships and the record "joiner" holds memberships in 9 of the 14 AGI Member Societies. It is probably more surprising to learn that there are 6 members of the AASG who belong to no other society than it is to find there are 9,091 AAPG members who belong to no other society.

The table at the top of page 14 shows the inter-relation of memberships among the 14 AGI Member Societies. This table, of course, involves only those 8,316 members who hold more than one society membership. The varying combinations of memberships should be of great interest not only to individuals in the profession but also to the Member Societies. Attention might be focused on the relatively few AAPG members who belong to the GSA and on the fact that less than 15 per cent of the Society of Exploration Geophysicists' members belong to the AGU. Numerous other interesting observations may be made.

It should be understood that the Master List totals for each society used in this compilation do not represent the exact number of members which that society had on March 1, 1958. The compilation of the Master List has been a long and complex job. It has been necessary to make certain arbitrary decisions in order to carry the task to completion.

The Master List compilation was started early in 1957 using membership lists obtained from the Member Societies. Each name was recorded on a single IBM card into which was punched society membership data and great care was exercised to avoid duplication (many men holding multiple memberships may use several addresses and/or aliases). When it was found that a member was not already re-

AGI ASTER LIST

eveals new nformation profession

MEMBER SOCIETY	MEMBERSHIP IN ONE SOCIETY ONLY	MEMBERSHIP[1] IN TWO OR MORE MEMBER SOCIETIES	MASTER LIST[2] TOTALS FOR EACH MEMBER SOCIETY
AAPG - American Association of Petroleum Geologists	9091	5317	14,408
AGU - American Geophysical Union	2487	2212	4699
AIME - American Institute of Mining, Metallurgical & Petroleum Engineers	3703	2324	6027
AASG - Association of American State Geologists	6	61	67
AGT - Association of Geology Teachers	100	316	416
GS - Geochemical Society	227	877	1104
GSA - Geological Society of America	974	3770	4744
MSA - Mineralogical Society of America	440	691	1131
PS - Paleontological Society	184	569	753
SSA - Seismological Society of America	239	520	759
SEcG - Society of Economic Geologists	144	811	955
SEPM - Society of Economic Paleontologists and Mineralogists	122	1178	1300
SEGp - Society of Exploration Geophysicists	3451	2307	5758
SVP - Society of Vertebrate Paleontologists	264	117	381
	21,432	21,070	

(1) 21,070 multiple memberships are held by 8,316 individuals; each of these individuals holds 2.5 memberships.

(2) Reflects number of members carried on GeoTimes mailing list on March 1, 1958. Some foreign members of Member Societies have not as yet been added. New members of Member Societies are added only as names are received from the Member Societies.

ceiving GeoTimes, his name was added automatically to the mailing list and as a result nearly 13,000 new names were added to the GeoTimes mailing list.

Special consideration was given to members of the AGU and the AIME who did not hold memberships in one of the other 12 AGI Member Societies, since it was felt that many of these individuals would lack or have only limited interest in AGI. A letter was written these individuals describing the AGI, its aims and activities. Those who returned a card indicating that they wished, as members of AGU or AIME, to be identified with the AGI, were placed on the Master List and started receiving GeoTimes. With both AIME and AGU members about 20 per cent of the persons so contacted returned the card. Some individuals holding only single memberships in these societies had previously been added to the GeoTimes mailing list as a result of having returned the 1953-54 Earth Science Register questionnaire.

The Master List totals for the AAPG and the GSA are the most accurate inasmuch as these societies have supplied AGI with monthly lists of address changes and membership changes.

Not all foreign members of all Member Societies have been added to the GeoTimes mailing list, although recently all members of the Geochemical Society were included. It is expected that other foreign members will be added, however, as soon as some non-members can be culled from the list. Indications are that GeoTimes is read with great interest by foreign readers.

Some interesting observations can be made from study and consideration of the AGI Master List. This list has been developed and is maintained by AGI in conjunction with the National Science Foundation-sponsored Earth Science Register. As it now stands there is considerable duplication of effort on the part of AGI and its Member Societies in maintaining separate overlapping, inter-related lists. This overlap is costing the profession thousands of dollars annually for membership lists are costly to maintain.

One society has proposed that AGI assume centralized responsibility for maintaining mailing lists, provide mailing service and record keeping. The maximum economy of time and resources would undoubtedly result from the adoption of modern electronic equipment which could provide integrated mailing, billing and other similar membership services.

The Master List is important to AGI, for it provides the basis for an analysis of the inter-relation of memberships of the Member Societies which could lead to a formula for financial support of the Institute based on a per capita sum. If it is assumed that $2 per capita is a reasonable level of support for AGI and GeoTimes, then each Member Society would be contributing $2 for each member belonging only to that society and approximately $0.80 for each member who holds multiple memberships (based on average of 2.5 memberships). Financing of AGI by such a formula would be equitable and provide a stability not now enjoyed.

Full utilization of data provided by the Master List should prove helpful to the profession in many ways.

MANPOWER *in a column —*

By HOWARD A. MEYERHOFF
Scientific Manpower Commission
1507 M Street, N.W., Washington 5, D. C.

Just as we were concluding that GeoTimes is not being read, we were deluged with letters from men in the armed services who had read the letter of Bob Dott, Jr., published in the December 1947 issue. Although we are not ready to boast, like the *Philadelphia Bulletin*, that nearly everybody reads GeoTimes, we know it is being read.

But there is still them what reads and them what don't. Some oil and mining companies do not know that men engaged in exploration and development may qualify for the Critical Skills Reserve Program, which requires only three months of military training. Some department heads are unfamiliar with the fact that instructors still of draft age may qualify for II-A deferment or for the Critical Skills Reserve Program. Even prospective draftees are not well informed about the choices available to them.

Although the Scientific Manpower Commission has been able to help many of the men who have written us, there are several things we cannot do: Once a man enters the service, he's in. ROTC men are in when they sign up for advanced ROTC training. They are obligated to serve, although in the Army they may now apply for a six-months training assignment instead of the standard two-year service tour. No such option exists in the Navy or Air Corps. Once a draftee is inducted for two years of service, we cannot get him transferred to the Reserve Program. Nor can we ordinarily secure for him an early release.

There is one thing we should be able to do but can't—that is to have geologists assigned to the Scientific and Professional Personnel Program and to work that makes some use of their training. Technically, earth scientists with Master's degrees or with the equivalent in experience qualify for the S & P P Program. But the Army does not know how to use geologists. During the past twelve months there have been only twenty openings for men with geological training, and the others who qualified were assigned to clerkships and similar slots in the Grade B category of the S & P P Program.

It is difficult to believe that there is not more need for the geologist in that branch of the service which lives, moves, and fights on the medium that is the earth scientists domain.

EASTERN AGT ELECTS

The Eastern Section of the Association of Geology Teachers met at Lehigh University on April 4-5. The following officers were elected:

J. Donald Ryan, Lehigh University, *President.*

Lincoln Dryden, Bryn Mawr College, *Vice President.*

Maurice B. Rosalsky, City College of New York, *Secretary-Treasurer.*

Lawrence Whitcomb, Lehigh University, Editor.

The Association of Geology Teachers aims to foster improvement in the teaching of the earth sciences at all levels of formal and informal instruction, to emphasize the cultural significance of the earth sciences, and to disseminate knowledge in this field to the general public.

RESEARCH COUNCIL MEETS

The National Research Council of the National Academy of Sciences was called together in Washington March 30-April 1 by Academy President Detlev W. Bronk to discuss current problems of broad significance to science. The meeting, which was attended by several hundred of the Nation's leading scientists, marked the first time that the National Research Council had been brought together since it was established by the Academy in 1916 at the request of President Woodrow Wilson.

Discussed on an inter-disciplinary basis were such broad subjects as *"Education in Science," "International Aspects of Science," "Beyond the International Geophysical Year," "Information and Documentation in Science," and "Problems in the Stimulation of Interdisciplinary Research."*

Pennsylvania Deep Well Map

A deep well map of Pennsylvania in six sections covering the entire State showing the locations and deepest horizons reached of the deep wells drilled in Pennsylvania to March 1, 1958. Scale of map is 1:250,000 or approximately one inch to four miles. Overall size is 48 by 84 inches. Copies are available at cost of reproducing in the *Geological Survey Offices: 401 Pittsburgh State Office Building, Pittsburgh; 110 E. Diamond Street, Butler; and 604 South Office Building, Harrisburg, Pennsylvania.*

The Mineral Riddle[1]

Is there a solution?

The March 1958 *GeoTimes* carried a plea for support of the U. S. Geological Survey and also pointed out what purported to be civil service discrimination against geologists as opposed to other currently more favored scientific personnel. The plea was meritorious but so typified the shortsightedness of the profession in regard to its own position on the national scene that I feel compelled to protest.

Where are the older statesmen who should have been speaking up through many years for the profession? The ailments of the U.S.G.S., the soft employment conditions for geologists in industry—these are all symptomatic of softness of the head in the profession. We should not be concerned with the cut in budget for the U.S.G.S. in terms of the drop in employment of geologists, but rather, we should be concerned with implications of the Survey budget in the conservation of our natural resources and the future well-being of our country and mankind. As earth scientists we are failing to point out to our fellow citizens and their duly elected representatives in government the fundamentals of conservation of our minerals and fuels. We have been letting a few professionally irresponsible atomic scientists speak for the resources we alone are competent to evaluate and promise pie in the sky to replace them. In our failure to inform we may be as surely destroying great segments of our natural resources as if we had consumed at 10 or 100 times our past and current rate.

We know that minerals become available and are in supply only in terms of the economics of finding and extracting; but have we told the story and its ramifications well enough? Shall this country which has produced and found X billion barrels of oil and Y million tons of metals produce and find only 2X billion barrels of oil and 1½Y million tons of metals, or should we find 10X billion barrels and 5Y million tons of metal? Shall we as a profession admit that only the fractional flush reserves easily found within the limits of present prices and costs are all that mankind can look forward to; that a better world is limited by the resources now in sight while the balance of 10 to 100 times the flush is unattainable.

American capital generated by this X billion barrels of oil is now fleeing abroad just as the capital generated by Y million tons of metal has largely fled abroad. Is this flight of capital wrong? Should we have import quotas and tariffs? Import quotas and tariffs are neither good neighborliness nor good conservation practice in this small world. Neither is it good practice to lose all your fluid so you cannot prime the pump. Should we lose the capital we generated with our resources and use it abroad? Shall we skim the cream and destroy the capital generated by both foreign resources and ours? Shall we penalize domestic producers in favor of importers or vice versa?

Is there an answer to this riddle? There might be. Our profession should have the brain power equal to any. If we give the facts to the people and thus the tools to our legislative representatives, who have the brains and the know-how to devise a solution, what will happen? Will they continue to allow us to turn a larger and larger segment of our resources into a forever unrecoverable category? Will they, at a time when populations are mushrooming and our needs to conserve our resources are greatest, cut down on the agencies whose work most protects and conserves them? Should the research of the U. S. Geological Survey and the Bureau of Mines, which represent stockpiles of resources for the future through knowledge, be cut now when such resources are in greatest peril of being lost forever? We need more research now. We must get our inventory of geologic maps and data, our extractive knowledge, in order while we still have something with which to prime the pump.

We do not want to have tariffs or quotas on raw materials, but to increase and protect the domestic factor of X and Y. A balancing expenditure in this country for every barrel of foreign oil or ton of foreign metal imported may be in order, for the proper conservation of resources requires that we use our flush resources to factor the X and Y by the greatest number. The principle of blending the rich ore with the poorer grades to increase the total metal recovered is a conservation practice which has its parallel in exploration. Perhaps our legislators can find a way to balance imports by requiring expenditures of importing companies for exploration in this country to be increased over the 1950-56 period. Perhaps an average budget increase of $1.00 for every barrel of oil imported and 5 cents for every pound of lead, zinc, or copper imported (figures used are sug-

(Continued on page 21)

[1]This is the text of a letter to the editor received from CASWELL SILVER, Consulting Geologist, Albuquerque, N. M.

BETTER GEOLOGISTS

continued from page 7

I am most familiar with the petroleum industry and will direct my remarks there although they probably apply equally well to other areas. Oil finding involves both surface and subsurface geology, but subsurface work is today by far the more important in terms of total effort and possible rewards. For surface geology many companies prefer to employ Ph.D.'s, recognizing that independent field work requires more experience and wider knowledge than a man with a lower degree is apt to possess. The philosophy for employment of subsurface geologists seems to be quite different. Subsurface geology is for the most part carried out in district and division offices by staffs of younger men under a senior geologist or geophysicist. The younger men are charged with compiling, correlating and interpreting the data of various kinds that pour into the office—electric logs, paleontologic picks, sample logs, seismic and gravity data, scout reports—masses of material of widely varying reliability and significance. Yet it is from these kinds of data that the complex variations in structure, lithology, porosity and permeability furnishing clues to likely oil traps must be deduced. Obviously a knowledge of the subtleties of sedimentology, stratigraphy and structure, of the electrical behavior of rocks and fluids, of velocity and density variations in rocks, of hydrodynamics of fluids—in short a very broad knowledge of geology and related aspects of physics, chemistry and mathematics—is a necessity for the capable subsurface geologist. His is the most difficult and potentially the most productive position open to petroleum geologists. Logically one would expect that a job requiring such maturity of knowledge and judgment would be entrusted only to the best trained geologists and geophysicists.

In practice, the reverse is usually true. Subsurface geology is regarded as a routine chore of "correlating" electric logs or seismograms and dutifully reducing the information to a map. This is usually a job for the most junior men on the staff, a "training" position from which the men hope to be "liberated" to a supervisory job within a few years. Yet the men actively working in subsurface geology are the ones in the best position to study the occurrence of petroleum and to make fundamental advances in the *science* of petroleum, providing only that they are prepared by training and temperament to penetrate beyond routine "correlations" into the basic scientific meaning of the tremendous mass of data available to them. Less well prepared men may advance the *art* of petroleum finding by sharpening and refining techniques available to them, but they are unlikely to have the necessary background to father the radical new advances which are the life essence of a science.

Castor Oil Era

Traditionally the employment philosophy of the petroleum industry has favored the employment of men with limited technical education because these men can be taught the necessary techniques of subsurface geology, as now practiced, and will plug away at their jobs more contentedly than will a man with a more advanced scientific training. True enough, but at a cost of really fundamental scientific advances. I believe it is not too far-fetched to say that if the biochemical industry had a similar philosophy we would still be living in our boyhood era of castor oil and epsom salts instead of custom-built wonder drugs. The partly educated chemists would undoubtedly have learned how to extract castor oil more efficiently, perhaps even to give it a pleasant flavor—but it would still be castor oil!

In petroleum we *are* still in the castor oil era of our boyhood. Our understanding of the occurrence of oil has advanced quantitatively, but the fundamental theories have hardly changed. Perhaps these theories are basically sound and nothing really new remains to be discovered. If so, petroleum geology is unique among the sciences. More likely the lack of advance is due to the constant pressure for snap decisions, based on a superficial evaluation of data. The demand for high scientific standards characteristic of other fields of science simply has not arisen in petroleum geology.

Raising Standards

The picture is not entirely an unhappy one. Many individuals and a few companies are well aware of the importance of the problem and are doing their best to raise the scientific standards of their geologic work. Oil company research establishments have sprouted in recent years and already are achieving important results. Men in these laboratories are not ordinarily in close contact with the mass of data available to the exploration and production geologist, however, and it is correspondingly less likely that these men will have the flashes of genius which may occur to the scientist who struggles daily with the fundamental data of the industry. Research laboratories are essential, but

"Pyrex is the metal obtained from the mineral pyrite," answered a geology 101 student on a recent exam.

• • •

"If it were not for the theories of isostasy and rigidity of the earth's crust, the Appalachian Mountains, after being peneplained once, would never rise again," stated by a Confederate student of geology, no doubt.

• • •

The Russians reportedly are ahead in all areas of science—A. P. Vinogradov, Geokimiya 1957, No. 3, p. 185, writes ". . . an isotopic analysis of the sulphur in the Vengerov meteorite which fell on October 11, 1959." It would appear that they are ahead by about two years in this instance.

• • •

Klippe; Ist ein bunchen rockers das gotten ausgethrowed bekausen zie war herausslippen.

---

they are also only a partial answer. What then might be done?

RESEARCHERS NOT ADMINISTRATORS

Unquestionably the placement of large numbers of Ph.D.'s in geological staffs as now constituted would create difficult personnel problems. A new approach is needed. In other industries, it has been possible to hire able scientists and *to keep them working as scientists* by setting up two parallel avenues of advancement, one through the administrative staff, and another through a series of grades of scientist, the financial rewards and professional status in comparable grades being similar.

Another possible answer would be the organization of oil-finding task forces, relieved of the day-to-day chores of the district geologist's staff and operating directly under the chief geologist. They should be elite groups, well paid and held to the highest scientific standards of excellence and achievement. Most companies have on their staffs geologists or geophysicists, now more or less frustrated by routine chores, who could spark such groups.

As a science, petroleum geology has its future largely ahead of it. Let's hope the "future" can be brought to pass before the finding power of current theory sinks to disastrously low levels.

Geology in a nutshell . . .

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Popular Geology in Print

by Mark W. Pangborn, Jr.

A second edition of *David E. Jensen's* MY HOBBY IS COLLECTING ROCKS AND MINERALS (Children's Press, 1958, $3.95) is very welcome. This well-illustrated book covers a wide variety of topics—how to recognize common minerals, how to display them, mineral clubs, list of museums, a brief bibliography—and is aimed at ages 10 to 15. Just the thing to supplement Jensen's rather short list of minerals is HOW TO KNOW THE ROCKS AND MINERALS, by *Richard M. Pearl* (New American Library, Signet Key book KD346, 1957, $.50), a reprint of the hardcover McGraw-Hill edition of 1955; in it 125 rocks and minerals are pictured and briefly described.

Jewelers and collectors will appreciate the dependable, detailed HANDBOOK OF GEM IDENTIFICATON, by *Richard T. Liddicoat, Jr.* (Gemological Institute of America, 1957, $6), now in its 5th edition. Rockhounds will enjoy *Ruby El Hult's* LOST MINES AND TREASURES OF THE PACIFIC NORTHWEST (Binfords & Mort, 1957, $3.75), the first compilation of lost mine lore for this area.

Books on geophysical subjects continue to pour off the presses. Many of the great natural disasters are described in FROM EARTHQUAKE, FIRE AND FLOOD, by *R. Hewitt* (Scribner, 1957, $3.95); more anecdotal than *Leet's* CAUSES OF CATASTROPHE (1948) and less adequate in its explanations of the geophysical background, this well-written volume will nevertheless fascinate anyone over age 14. The Gulf Stream is the subject of *Hans Leip's* RIVER IN THE SEA (Putnam, 1958, $3.75), a mixture of oceanography and history which attempts to show how the great current influenced western civilization; readable enough, but more loaded with extraneous detail than *Chapin* and *Smith's* somewhat similar THE OCEAN RIVER (1952).

We are glad to see that one of the "Harvard Books on Astronomy," *Fred L. Whipple's* EARTH, MOON AND PLANETS (Grosset & Dunlap, 1958, $2.95) is now available in an inexpensive reprint; though written in 1941, most of the text can stand unchanged, and recent developments are summarized in a new introduction; fine for high school students and the public. *John Euller's* ARCTIC WORLD (Abelard-Schuman, 1958, $3) describes some highlights of Arctic exploration and research in a vivid style that will grip the attention of teen-agers.

BOOKS

MAP OF SURFACE FORMATIONS OF THE NORTHERN PENNINSULA OF MICHIGAN, *compiled by Helen M. Martin, 1957. Scale 1:500,000. Dept. of Conservation, Geological Survey Division, Lansing, Michigan.*

This map shows principally the glacial features of the Upper Peninsula. Bedrock details are undifferentiated except on a very generalized small inset map.

A GUIDE TO THE GEOLOGY AND OIL FIELDS OF THE LOS ANGELES AND VENTURA REGIONS, *edited by James W. Higgins for the Pacific Section, AAPG, 232 pages, 88 illus., 1958. Order from Martha Gallagher, Kern Oil Co., 900 Wilshire Blvd., Los Angeles 17, Calif. $7.00.*

This guide book prepared for the 1958 AAPG-SEPM convention field excursion brings together much previously unpublished information on the description of oil fields, geology, correlations, etc. It is a significant contribution to the geology of the region.

GENERAL GEOLOGY LABORATORY WORKBOOK, *Physical Geology and Historical Geology, prepared by the Teaching Staff of the Geology Department, University of Texas, and edited by Samuel P. Ellison, Jr., Harper's Geoscience Series. Harper & Bros., New York $3.75.*

This laboratory manual of elementary geology is designed for simplicity, precision and flexibility of use. Without emphasizing a quantitative approach it covers adequately under two sections, Part I, Physical Geology, and Part II, Historical Geology, the principal fields normally taught in elementary courses.

Each chapter has clear, concise descriptive matter with neat charts, tables and figures; suggestions on laboratory equipment, supplies and methods; provocative exercises and a list of study questions. The instructor may exercise his own ingenuity in selections of materials. The list of study questions provides a choice of both fact and "think" questions which range in depth from elementary to advanced. Except for the approach (in shorelines and shore features) of using sub-

merging and emerging shorelines instead of primary and secondary shorelines, the handling of most subject matter and study questions is up-to-date.

J. F.

AN INTRODUCTION TO THE GEOLOGY AND MINERAL RESOURCES OF THE CONTINENTAL SHELVES OF THE AMERICAS, *by J. Trumball, J. Lyman, J. F. Pepper and E. M. Thomasson, U.S.G.S. Bull. 1067, 92 pp., 1958. Order from Supt. of Docs. U.S. Gov't Printing Office. $0.75.*

Published in this bulletin are four papers summarizing known data on the continental shelves which were presented by the U.S. Delegation to the Organization of American States Specialized Inter - American Conference on "Conservation of Natural Resources: The Continental Shelf and Marine Waters", held at Ciudad Trujillo, Dominican Republic, in March 1956.

VERTEBRATES OF THE UNITED STATES *by W. Frank Blair, Albert P. Blair, Pierce Brodkorb, Fred R. Cagle, George A. Moore. ix 819 pp., numerous figs. New York: McGraw-Hill Book Co., Inc. $12.00.*

In six parts: Introduction (W. F. Blair), Fishes (Moore), Amphibians (A. P. Blair), Reptiles (Cagle), Birds (Brodkorb) and Mammals (W. F. Blair). A very useful manual covering all species of vertebrates living within continental U.S. "Geologic range is indicated by citation of the earliest known record for each higher category." Keys down to species are given. For fishes, Berg's system of classification is used. This does not express the phylogenetic relations as well as some others. As an example, it does not bring to the fore the important and interesting fact that a majority of the most primitive bony fishes now living are North American. The volume should be of great help to those who have to deal with Pleistocene and latest Tertiary vertebrate faunas.

B.P.

MINERAL RIDDLE *continued from page 17*

gestive only) will maintain our national interest. Thus wholly domestic producers will also be able to continue in business. The consumer and the nation will benefit from improved supplies for the future when the cream of foreign deposits is gone if sustained basic research has brought a higher percentage of resources into the available category. Incidental thereto perhaps the need for geologists and their importance to mankind will be put in the proper perspective and employment of geologists will increase.

The foregoing is not offered as a panacea, nor are the suggestions even the best solution to the problem, but certainly it is the responsibility of our profession to get the conservation story across and to give the people the facts so that the mounting dilemma of conservation, foreign imports, and domestic employment (not alone geological) can be resolved. Is this type of conservation not a proper concern of the AGI?

Southern Methodist Appointment

The Geology Department of Southern Methodist University announces the Appointment of Dan E. Feray as Magnolia Petroleum Company Professor of Geology. The professorship has been set up by the Magnolia Petroleum Company to encourage and support superior undergraduate teaching. Doctor Feray received the bachelor's degree from the University of Tulsa; the master's degree from the University of Illinois and the Ph.D. from the University of Wisconsin. After holding several industrial and teaching positions, in 1950 he became head of the geological research group at the Magnolia Field Research Laboratories and in 1957 founded Feray Geological Service in Dallas. Doctor Feray will begin his duties as Magnolia Professor in the fall of 1958.

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DEAR EDITOR:

I shall greatly appreciate receiving 1 or 2 copies of your booklet entitled *"Shall I Study Geological Sciences?"*. This will help me to encourage this subject in a college which has recently started the teaching of geology for the first time in East Africa.

Should any of your readers wish to carry out any exchanges of geological specimens, will they be so good enough as to write to me? There are certainly some interesting alkaline igneous rocks, carbonatites and Rift Valley sediments to be had here.

May I take this opportunity of thanking you for sending me your interesting GeoTimes which is much enjoyed in our Geological Department by students of all races.

Cordially yours,

DR. I. S. LOUPEKINE
The Royal Technical College of East Africa
Nairobi

DEAR EDITOR:

Enough is enough! From time to time I have noticed the term "Engineering Geologist" rather loosely used in your classified ads, but the latest is too much. Since November 1957 the following has appeared in your positions wanted column: "Engineering Geologist, experienced in all phases of ground water, water supply and waste disposal problems—." This sounds like a ground water geologist to me. Engineering geologists often have to deal with ground water problems but it appears to me that a ground water specialist is not necessarily an engineering geologist.

The Division of Engineering Geology of the GSA has given the following definition of a professional engineering geologist[1]: "A professional engineering geologist is a person who by reason of his or her special knowledge of the geological sciences and their application to engineering practice, acquired by professional education and practical experience, is qualified to render professional services for the purpose of assuring that geologic factors affecting the location, design, construction and operation of engineering works are adequately provided for by the responsible engineer." The qualifications of a "professional engineering geologist" are further stated to include four years of experience in charge of important engineering geology work. Perhaps if you will publish the above definition, fewer geologists will use the term "engineering geologist" when they mean something else.

Yours truly,

BRUCE E. CLARK
District Geologist
Nashville District, Corps of Engineers
Nashville, Tennessee

DEAR MR. STEPHENSON:

Your book "Earth for the Layman," by Mark W. Pangborn, Jr., is mentioned on page 28 of the GIRL SCOUT LEADER for May. As you probably know, the LEADER is our magazine for the more than 700,000 adults in Girl Scouting.

We will send you a copy as soon as the May issue comes from the printer.

We appreciate your making this help available to the Girl Scouts and would be much interested to hear what kind of response you receive.

Sincerely yours,

MRS. KURT LIST
Associate Editor
GIRL SCOUT LEADER

DEAR EDITOR:

I just wanted to give a quiet cheer for W. Furness Thompson's *"Why Don't Scientists Admit They're Human?"* As each year goes by one becomes more and more depressed at the volumes of dull reading he has to wade through—has even helped create—and yet I bet there isn't one of these writers who hasn't felt at one time or another "Why can't I tell them what *really* happened?"

Even with students who come to us with potential fire we apparently do our best to wet them down. As an illustration of this fire I am enclosing a poem by one of my students, Veris Wessel, in beginning geology. She became entranced with the story of orogeny and chose poetry as her way of expressing it. Whether it is good poetry or not is perhaps beside the point. I happen to like it because I too have al-

[1] *"Teaching Aids & Allied Materials in Engineering Geology,"* Geological Society of America, September 1957.

ways felt something special about orogeny. The real question perhaps is how many of us who have been in geology a long time ever think anymore about the poetry of the game we are in, much less ever get around to any expression of it. This is a sorry condition. Would it take an orogeny to change it?

Sincerely yours,

CHARLES C. BRADLEY
Montana State College

THE MOUNTAIN

Conceived beneath the sea
In a sedimentary bed,
Born of Paleozoic parents;
Free from the tireless tread
Of Time? Not so! For Time
Enforces growth, maturity, and death.
Yes, you've intimately known Time.

Rising now in all your glory,
Your pinnacles scratching the sky;
Your queenly outline darkly etched
Triumphantly, a joy to human eye.
The test? Too difficult to know!
How critical the decision;
How precarious the flow!

Strong intrusion of great masses,
Thick extrusion of basalt;
The slow, thermal construction,
And the magnificent fault!
Painful alteration, the tilted, broken spine;
Subtle, silent scars are here
To testify to Time.

The cycle has returned upon itself,
The fluids and the stirrings now are stilled;
Snow adorns your Heaven-reaching crown;
Your cirques are smooth, your veins are filled.
You stand above your girdle-ridge of slate,
Proud to the wind (yet humble before Time),
And praise your wondrous, elevated state.

DEAR EDITOR:

In Petroleum Week, March 7, 1958, vol. 6, No. 10, page 14, the term *mantle* is used to describe the sub-crust beneath the "Mohorovicic Discontinuity." The A.G.I. "Glossary . . ." uses mantle in the sense of mantle rock or regolith. To use it in any other sense only will lead to confusion, it seems to me. Can something be done to avoid the use of mantle when part of sub-crust is meant? There is confusion enough in geologic terminology now!

Respectfully yours,

GRANT T. WICKWIRE
Hanover College

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VACANCIES

MARIETTA COLLEGE, Marietta, Ohio. Opening September 1958 for qualified instructor to teach paleontology, sedimentation-stratigraphy, etc. Apply W. G. Steel, Department of Geology.

APPLICATIONS ARE INVITED for the position of Professor and Head of Department in Geology, on the scale $6800-100-8400, to take effect at 1st September, 1958. Assistance towards transfer expenses is contributed by the University. Applications, with complete curriculum vitae, and the names and addresses of three referees should be addressed to the President, Memorial University of Newfoundland, St. John's, Newfoundland, Canada.

HOFSTRA COLLEGE, Hempstead, N.Y. Ph.D. to teach mineralogy and petrography. Rank and salary dependent upon qualifications. Write F. Durham, Chairman Dept. Geology.

GEOLOGIST: To teach courses in Physical, Historical, Structural and Field Geology, and Geomorphology in an expanding program of the State University Teachers College. Rank and Salary—range $5100—$7206— depend upon training and experience. Ideal geological setting for teaching and research. Personal interview necessary. Apply with credentials and full personal history to Dr. F. Reese Nevin, Chairman Department of Science and Mathematics, State University Teachers College, Plattsburgh, New York.

PRODUCTION VICE-PRESIDENT, to conduct exploration, drilling and production activities of substantial independent with growing domestic and foreign operations. Stock options. Send complete background, references, salary range, phone number and any limitations on U.S. location. Confidential treatment. BOX 89.

BAYLOR UNIVERSITY, Waco, Texas. Rank and salary dependent upon qualifications. Ph. D., to teach mineralogy and related courses. Write chairman, Dept of Geology.

POSITION OPEN as visiting professor for one year (Sept. 1958—June 1959) at northeastern university. Stratigraphy, sedimentation, and structure. Teaching load light. Applicants please state all qualifications. Reply to BOX 90.

APPLICATIONS are invited for post-doctoral research fellowship in sedimentary petrology and sedimentation, value $3700 for single, $4500 for married man, both tax free, plus travel, and generous equipment allowances, research facilities in new building. Geology Department, University of Western Ontario, London, Canada.

GEOPHYSICIST or GEOLOGIST. San Francisco Peninsula technical firm needs Geophysicist or Geologist with college degree to head up promotional and service activities relating to growing line of geophysical instruments. Desire individual with strong technical and managerial competence with flair for selling in highly specialized research market. Must have good working familiarity with electronic instruments. Send resumes stating salary requirement to Box 91.

POSITIONS WANTED

BOX 359. GEOLOGIST, B.S., 6 years exploration in the Four Corners, Panhandle and West Texas. Experience includes seismograph and administration. Desires more responsibility. Excellent references.

BOX 392. GEOLOGIST, BA, married, 3½ years mapping, areal and detailed, metallic and nonmetallic mineral evaluations. Photogeology, some geophysics, report writing.

BOX 395. GEOLOGIST, M.A., Ph.D. residence requirements completed; dissertation partially completed; field and teaching experience. Desires teaching position in either Mineralogy, Elementary Geology, Structural Geology or Geomorphology. Single, 26. Available September 1958.

BOX 404. ECONOMIC GEOLOGIST, PETROLOGIST, Ph. D., actually employed as Visiting Professor at a well-known institution, desires similar position for next year, or permanent affiliation with a geology department of high professional standards. Will also consider research, exploration, or subsurface work. Has taught all geology subjects with exception of intermediate and advanced paleontology and possessed of functional experience. Very good references and available in June 1958.

BOX 417. GEOLOGIST, 35, Ph.D. in June 1958, B.S. in Electrical Engineering, experience with U.S.G.S. Desires teaching position in college or university, preferably in western U.S. Interested principally in structural geology and stratigraphy.

BOX 420. GEOLOGY PROF. desires to relocate west of 105° W Long. Widely varied background in both education and experience. BA and MS degrees. Want position that affords some research and/or consulting opportunity. Available 1 June 1958.

BOX 428. PALYNOLOGIST, MS, 31, married, two years collegiate, three years industrial experience in Spore and Pollen field. Desires to relocate with company interested in such a program. Would also consider college undergraduate teaching position with research and advanced degree possibilities in Palynology.

BOX 432. GEOLOGIST, Ph.D., 48, wife and child, 18 years broad experience in Economic Geology, Mineralogy, Tectonics, Mining and General Geology, Petrography; detailed and reconnaissance mapping in wide areas of Europe, Asia and North America; all phases of exploration and research; have publications and an invention patent; speak English, German, Russian, Turkish and several less known oriental languages; seek position in research or exploration, will consider teaching or consulting.

BOX 433. GEOLOGIST, Ph.D., 48, family, desires teaching position particularly in Elementary Geology, Mineralogy, Petrology, Economic Geology, or Structural Geology. Presently employed by U.S.G.S. Experience includes 9 years teaching, part as head of small department. Available for Summer or Fall opening.

BOX 434, GEOLOGIST, Ph.D., desires permanent teaching position. Interest in teaching Elementary Geology, Sedimentation, Stratigraphy, ground water, Engineering Geology, Economic Geology, Metamorphic Geology. Ten years experience in teaching, USGS, industry.

BOX 445. GEOLOGIST, B.S., 26, recent graduate, family. Desire position as geologist. No specialities, average student, well rounded background. 4 years drafting experience.

BOX 449. GEOPHYSICIST, Canadian, B.Sc. mathematics and physics, Ph.D. physics, finishing two years overseas research geophysics, 29, married, seeks responsible industrial or university position in Canada or United States starting Autumn 1958.

BOX 451. GEOLOGIST, 49, Ph.D., married. Experienced and capable. Desires position in small college or university. Prefer undergraduate teaching.

BOX 453. MINING EXPLORATION GEOLOGIST. Ph.D., 48. Foreign or domestic. Geophysical experience.

BOX 454. GEOLOGIST-GEOPHYSICIST, Ph.D., cosmopolitan training and teaching-consulting-advisory experience since 1937 in States, Latin America, West Indies, Europe, Middle East. Fluent Spanish, French, German. Specialties Economic and Engineering Geology, including Groundwater, Photogeology, Structure, Gravity, Magnetic. Tectonics a major interest. Desire relocate university or with consulting-investment group where intimate contacts and foreign acquaintance could be used. Publications, also much translating work.

BOX 456. PETROLEUM GEOLOGIST-GEOPHYSICIST, Ph.D. 15 years major company experience, 5 years consultant. Foreign work acceptable.

BOX 458. GEOLOGIST, Ph.D., experienced. Desires teaching position. Principal interest is SEDIMENTATION, MARINE GEOLOGY, PETROLEUM GEOLOGY and GROUNDWATER.

BOX 460. GEOCHEMIST - MINERALOGIST, B.A., M.S., course credits completed for Ph.D.; background in high temp. and press. phase equilibria, mineralogy, petrology (hard & soft rock), x-ray diffraction; professional experience.

BOX 461. GEOLOGIST, minor in mineralogy, masters degree, vet., 40, family. Good academic record. 8 years Canadian metal mining, field geology, seeks lab. determinative work, industrial research, teaching or journalism.

BOX 462. GEOLOGIST, Ph.D., 30, married, 2 children, teaching experience as graduate assistant. Desires position with oil company or teaching in college or university. Background in paleontology, stratigraphy, and allied fields. Available Sept., 1958.

BOX 463. GEOLOGIST-INSTRUCTOR, B.A., M.S., Ph.D. course work and languages completed, 28, married, teaching and summer field experience. Desires college teaching starting Sept. 1958 or Feb. 1959.

BOX 464. GEOLOGIST, 23, married, B.S. in June, 1958. Interested in all phases of Geology. Desires position either in or outside U.S. where hard work leads to advancement. Resume on request.

BOX 465. GEOLOGIST, M.S., 27, some exploration exp., rated commerical pilot, desire domestic or foreign exploration.

BOX 466. PALEONTOLOGIST, Ph.D., 9 years experience at university teaching. Desire combined teaching-museum position with opportunity for research. Have experience at museum display and interested in setting up biology-paleontology teaching museum.

GEOLOGIST, B.A., 23, married. Went directly from college to military. Desire position with oil or engineering firm, foreign or domestic. Eager to learn. 1st Lt. Phillip R. Simons, 2331 Lumpkin Cir., Augusta, Georgia.

BOX 467. SUMMER WORK. Professor, Ph.D. in geology, experienced U. S. and foreign in petroleum, mining and government survey geology, desires summer employment.

BOX 468. GEOLOGIST, Ph.D. August, 28, married, 7 summers experience in metals exploration Lake Superior region and Quebec. Familiar with exploration procedures, equipment and lab investigations. Seeks exploration or research Canada or overseas.

BOX 470. GEOLOGIST, B.S., 27, vet., married, graduate in June. Desire either field or laboratory position. Experience in military electronics. Available in late June.

BOX 471. GEOLOGIST, M.S., Ph.D. residence completed, dissertation in progress. Excellent record at well known NE universities. Married, vet., 31, USGS experience. Publications, best references. Prefer teaching (Stratigraphy, Paleo., etc.) but will consider oil or research openings. Available September.

(Continued on page 28)

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POSITIONS WANTED

continued from page 25

BOX 472. GEOLOGIST-MINERALOGIST, 28, M.S., with good background in mineralogy, crystallography, X-ray diffraction, and X-ray and emission spectrography, and also with experience in various types of exploration and mineral beneficiation, desires research or exploration position.

BOX 473. PLEISTOCENE GEOLOGIST-GEOMORPHOLOGIST, 34, married, 2 years oil company; 5 years state survey, Ph.D. this summer, wants teaching or research.

BOX 474. PALEONTOLOGIST, 41, single, twelve years of foreign and domestic work with major oil companies, desires position that involves the setting up and heading of a paleontological laboratory for an oil company in a new foreign area of exploration. Besides Tertiary and Cretaceous foraminifera, experience includes megafossils, and field and wellsite geological work.

BOX 475. GEOPHYSICIST, 32, BS, 1 yr. grad. study. 8 yrs. experience major and contract Gulf Coast, Oklahoma, west Texas, Rocky Mountains. 2 yrs. guiding and supervising small company operations.

BOX 476. GEOLOGIST, BS, new graduate. Two years Kelsh experience. Interested in photogeology position. Some field experience.

BOX 477. GEOPHYSICAL ENGINEER, 29, married, 5½ years experience seismic, gravity, resistivity in petroleum and mining. Desires employment in South America in exploration interpretation or research.

BOX 478. GEOLOGIST, M.S., 25, unmarried. Experience in sedimentary petrology, structural geology, and permafrost. Finish army service in July. Desire foreign exploration work or sedimentary petrology research. More interested in valuable experience than salary. Will work anywhere. References.

BOX 479. GEOLOGIST, ENGINEER, Ph.D. (in geology), 33, family. Desires teaching position in college or university, preferably in western U. S., with opportunity for research and/or consulting. 5 years experience with major oil company in all phases of petroleum exploration. Capable of teaching all phases of geology and/or petroleum geology (except paleontology) as well as subjects leading to engineering degrees (have B.S. in C.E. from major university). Have major in mathematics and minor in chemistry. Excellent references.

GEOLOGIST FOR CALIFORNIA. Single, 34, veteran, accomplished writer and photographer. B.S. Columbia, 1952; pointless postgraduate year, Berkeley, 1954-55. Mud-logging, 3 mos., Texas; Chief Computor, seismic crew, 15 mos., Oklahoma; Subsurface Geologist, 20 mos., central Venezuela. Petroleum, mining or engineering geology, in California only. W. R. C. Shedenhelm, 1929 N. Whitley Ave., Hollywood 28.

BOX 480. TEACHER, Ph.D., 38, family, 6 years varied teaching experience and 10 years petroleum exploration. Desires teaching/research position in field of stratigraphy, structural geology, petroleum geology. Presently hold tenure as associate professor, leading state university. Available summer.

GEOPHYSICIST, GEOLOGIST, French, 32, single, fluent English, German. French degrees. 3 yrs. experience research seismic. Mineralogy. Desires position any field including geology, minerals or petroleum in Europe or America. Write: Berthelot, Ch. De La Ratte, Thonon, Haute Savoie, France.

BOX 481. RESEARCH PETROLEUM GEOLOGIST-STRATIGRAPHER, 30, M.S. Extensive experience in most provinces U. S. and Canada. Have utilized newer exploration tools; Entropy Lithofacies mapping, Gamma-Halo surveys, porosity maps, moment maps, etc. Desire position of responsibility in research or exploration. Executive ability.

GEOLOGIST, M.S., 27, seeks part-time teaching position in Boston area. M. H. Francis, Trinity College, Hartford, Conn.

BOX 482. MINERALOGIST-GEOLOGIST, M.Sc., 35, at present holds responsible position in major research institute, wishes to relocate to industrial research and development. Wide experience in nonmetals, U. S. and foreign, government and industry. Report writing, evaluations, publications.

BOX 483. PETROLEUM-GEOLOGIST, M. S., 30. Diversified experience; subsurface, research, teaching. Knowledge of Texas, midcont., Rocky Mts., Appalachian, Canada. Creative thinker, aggressive, proven oil finder, capable of organizing or operating exploration or research group. Desire domestic or foreign position of responsibility.

BOX 484. GEOLOGIST-ENGINEER presently engaged in exploration with oil major desires position in subsurface or reconnaisance geology, engineering or coordinating work requiring special drive and talent and giving opportunity for individual self-expression; 6 years varied experience in petroleum and mining exploration and production; experience in U. S., Canada, Australia, South America, and North Africa; age 32, single; foreign work only on permanent or roving assignment; no objection to temporary employment in U. S.

BOX 485. GEOLOGIST, 34, single, experienced in Mining, Field Work, Geophysical, Exploration, Drafting (Oil), Mechanical Engineering (Mining Equipment) and Laboratory Work. Prefer foreign work in the nature of Mining, Exploration, Development or Teaching. Total experience about 9½ years. A.B. degree and some post graduate work.

BOX 486. GEOLOGIST, Ph.D., 28, single. Desires teaching position in college or university. Interest in sedimentation, stratigraphy, petroleum geology, geochemistry, geomorphology, glacial geology. Can teach any undergraduate course. Would be interested in additional research work. Excellent references. Available September.

STUDENT-GEOLOGY MAJOR, interested in vacation position. Salary nominal, experience desired. Michael Jaron, 1591 West 9th Street, Brooklyn 4, New York.

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